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CONTINUOUS WASHING AND TRANSFER OF ARTICLES TO A CLEAN ROOM

Abstract:

A method and installation for effecting continuous washing and transfer of articles e.g. bottles to a clean room, comprising the steps of: conveying the articles continuously on a conveyor means extending within enclosure means and into a clean room, and within the enclosure means sequentially subjecting the articles to a bactericidal wash and to bactericidal radiation.

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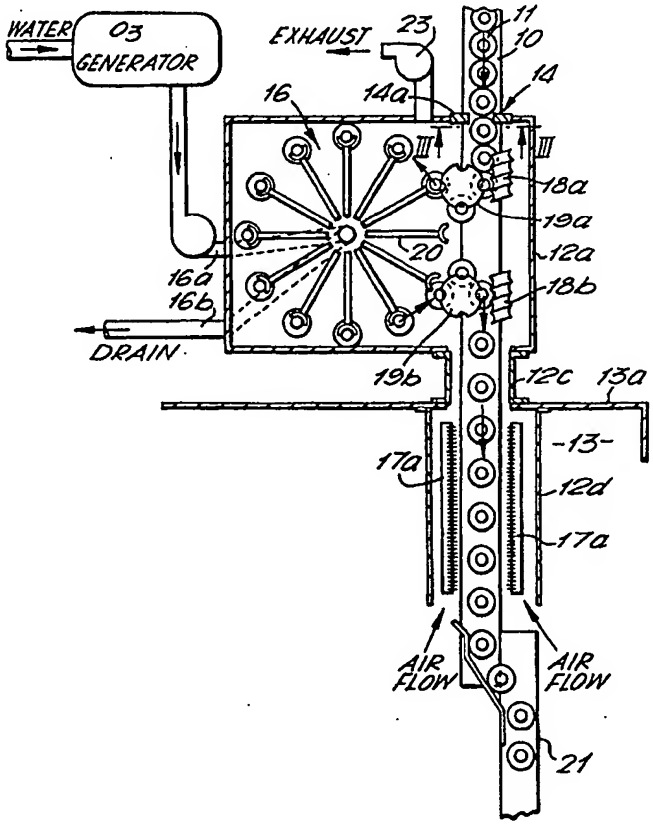
(57) Abstract

A method and installation for effecting continuous washing and transfer of articles e.g. bottles to a clean room, comprising the steps of: conveying the articles continuously on a conveyor means extending within enclosure means and into a clean room, and within the enclosure means sequentially subjecting the articles to a bactericidal wash and to bactericidal radiation.



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CONTINUOUS WASHING AND TRANSFER OF ARTICLES TO A CLEAN ROOM

This invention relates to a method for effecting continuous washing and transfer of articles to a clean room, and to an installation for use in carrying out such method.

The invention is concerned particularly, but not exclusively, with articles in the form of bottles intended to be charged with liquid for human consumption, for example, mineral water.

In this description, the term "clean room" means a room-like enclosure associated with a supply of clean air introduced to maintain a pressure in the clean room slightly greater than ambient atmospheric pressure for the purpose of inhibiting the entry into the clean room of air-borne contaminants of any kind. Clean rooms are known per se and their construction is not a feature of the present invention.

Although the use of clean rooms in the bottling industry is fairly recent, clean rooms are commonly used in the pharmaceutical industry. The number of operations which can be carried out inside the clean room is, however, very limited. In fact, the only operation generally carried out in the clean room is the actual filling. Other processes, such as washing the containers, applying labels, etc are carried out outside the clean room.

Normally in the pharmaceutical industry, the containers to be filled are treated and sterilized in batches on the way to the clean room. In a commonly used system, the containers are loaded from outside into a box-type chamber where they are washed and sterilized, usually by heat. The sterilized containers are then

conveyed out of the chamber and then into a clean room for filling.

Although this method is sufficient for pharmaceutical products, where the number of containers is relatively small, the batch-wise transfer process is too slow and inefficient for use in the food and drink bottling industry where the number of bottles to be processed is very large.

Recently, clean rooms have come to be used in the bottling industry. To speed up the process, some systems are arranged to carry out more operations actually within the clean room, such as washing and/or rinsing. This, however, has the disadvantage of introducing contaminants into the clean room.

Other systems use a step-wise process to convey bottles into a washing or rinsing machine and then the rinsed bottles are conveyed out of the rinsing machine and into the clean room. Again, this has the problem of introducing contaminated bottles into the clean room.

According to the present invention, there is provided a method for effecting continuous washing and transfer of articles to a clean room, comprising the steps of:

conveying the articles continuously on a conveyor means extending within enclosure means and into a clean room, and

within the enclosure means sequentially subjecting the articles to a bactericidal wash and to bactericidal radiation.

Preferably, the said method includes the step of inducing an exhaust current from the enclosure means to ensure a continuous air flow therethrough from the clean room.

Preferably, the articles are bottles intended to be charged with mineral water and the bactericidal wash

is water and ozone and the bactericidal radiation is ultraviolet radiation.

Further, according to the present invention, there is provided an installation for use in the continuous washing and transfer of articles to a clean room, comprising:

a continuous conveyor for conveying the articles and extending within enclosure means and into a clean room, an exit from the enclosure means being within the clean room,

a washing means for use in washing the articles and disposed within the enclosure means adjacent an entrance thereto, and

an irradiating means operable to emit bactericidal radiation towards the conveyor and articles thereon and disposed within the enclosure means downstream of the washing means.

Preferably, there is provided a venting means adjacent the entrance to the enclosure means, being operable to induce an exhaust current from the enclosure means.

Preferably, the enclosure means comprises a cabinet housing the washing means and a duct connecting the interior of the cabinet with the interior of the clean room.

Preferably, the washing means comprises a rotary bottle-washing mechanism.

Preferably, the irradiating means comprises ultraviolet lamps.

Preferably, the irradiating means produces heat.

Also, in a preferred embodiment, the bottles are supported, during transfer, by a pair of guide rails above the conveyer, which support the necks of the bottles to prevent light plastic bottles from falling.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Fig. 1 is a diagrammatic plan view of an installation for the washing and transfer to a clean room of bottles, all in accordance with the present invention;

Fig. 2 is a diagrammatic plan view similar to Fig. 1, but showing additional constructional features and modifications; and

Fig. 3 is a sectional elevation on the line III-III in Fig. 2 to a larger scale than Fig. 2.

In Fig. 1 of the drawings, the installation comprises a continuous conveyor 10 for carrying articles in the form of bottles 11 and extending within an enclosure means 12 and into a clean room 13. The enclosure means 12 has an entrance indicated by reference numeral 14 and an exit indicated by reference numeral 15 and disposed within the clean room 13.

The enclosure means 12 consists of a cabinet portion 12a which houses a bottle-rinsing mechanism 16 which is disposed adjacent the entrance 14; and the enclosure means 12 further consists of a duct 12b within which is arranged an irradiating means in the form of a bank or banks of ultraviolet lamps 17.

The clean room 13 is bounded by a wall of which a portion is indicated by reference numeral 13a;. and it will be understood that the duct 12b passes through the wall portion 13a in such a manner that an air-tight seal is effected between the duct 12b and the wall 13a.

The bottle-rinsing mechanism 16 is operable to rinse and drain the insides of the bottles; and the mechanism is supplied with water incorporating a bactericidal agent, e.g. ozone, by means of a supply

pipe 16a. The rinsing mechanism is drained by means of a drain pipe 16b.

Operation of the above described installation is as follows. The clean room internal air pressure is maintained above ambient pressure in a known manner sufficient to induce an outward air flow through the duct 12b and cabinet 12a. Bottles 11 carried inwards on the continuous conveyor 10 are first subjected to a bactericidal wash by means of the rinsing mechanism 16. On emerging from the rinsing mechanism cabinet 12a, the bottles on the conveyor 10 enter the duct 12b and are subjected to bactericidal radiation from the ultraviolet lamps 17. Thus, the exterior surfaces of the bottles 11 are substantially disinfected as is the inward moving run of the conveyor 10.

The bottles 11 may be supported as they are conveyed along the conveyor 10 by a pair of guide rails (not shown) extending along the conveyor 10 and above it. This rails hold the necks of the bottles 11 to prevent light plastic bottles from falling.

Heat, which is also produced by the lamps 17, assists in vaporising water droplets remaining on the bottles 11 from the previous wash treatment; and an ozone-rich environment is created within the duct 12b and the cabinet 12a which is continuously exhausted at the entrance 14 due to the higher pressure within the clean room 12.

In a modification of the installation described above, a venting means (not shown in Fig. 1) is incorporated in the cabinet 12a adjacent the entrance 14 and operable to induce a positive exhaust current from the enclosure means to ensure a continuous air flow therethrough from the clean room 13. The venting means (not shown in Fig. 1) is preferably an exhaust fan or an exhaust impeller.

The installation described above provides a means for the continuous washing and transfer of bottles into the clean room and accomplishes improved production rates compared with installations hitherto proposed.

In Figs. 2 and 3 of the drawings, parts corresponding with those in Fig. 1 are given the reference numerals used in Fig. 1. In Fig. 2, the entrance 14 is provided with a replaceable insert 14a having an aperture configured to match the outline of a bottle 11 as is shown in Fig. 3. This arrangement reduces the opportunity for contaminant dust particles and the like to enter the cabinet 12a at the entrance 14.

In Fig. 2, the rinsing mechanism 16 is a rotary mechanism know per se. Bottles 11 entering the cabinet 12a on the conveyor 10 are engaged regularly by a feeder worm 18a and carried by a first transfer wheel 19a to an array of radial arms 20 which, whilst turning anti-clockwise, sequentially invert the bottles 11 over spray heads (not shown) for washing and then re-invert the bottles for return to the conveyor 10 by way of a second transfer wheel 19b and feed worm 18b.

The cabinet 12a is free-standing adjacent the clean room wall 13a except that the cabinet 12a is linked to an aperture in the wall 13a by means of a first duct 12c.

Within the clean room 13 a second duct 12d encloses the inner end portion of the conveyor 10 and also mutually-opposed banks of ultraviolet lamps 17a.

In this embodiment, the conveyor 10 returns at about the inner end of the duct 12d (that is, the exit from the enclosure means defined by the cabinet 12a, duct 12c and duct 12d); and a bottle deflector or "scroll" 22 moves the bottles onto a continuous conveyor 21 leading to a bottle-filling station (not shown).

The cabinet 12a is provided with venting means in the form of an exhaust fan 23 which is operable adjustably to ensure a continuous and substantially even air-flow from the clean room 13.

Generally, the operation of the Fig. 2/Fig. 3 embodiment is as described with reference to Fig. 1.

CLAIMS

1. A method for effecting continuous washing and transfer of articles to a clean room, comprising the steps of:

conveying the articles continuously on a conveyor means extending within enclosure means and into a clean room, and

within the enclosure means sequentially subjecting the articles to a bactericidal wash and to bactericidal radiation.

2. The method of claim 1, further including the step of inducing an exhaust current from the enclosure means to ensure a continuous air flow there through from the clean room.

3. The method of claim 1 or 2 wherein the articles are bottles intended to be charged with mineral water.

4. The method of any preceding claim wherein said bactericidal wash comprises water and ozone.

5. The method of any preceding claim wherein said bactericidal radiation is ultraviolet radiation.

6. Apparatus for the continuous washing and transfer of articles to a clean room, comprising:

a continuous conveyor for conveying the articles and extending within enclosure means and into a clean room, an exit from the enclosure means being within the clean room,

a washing means for use in washing the articles and disposed within the enclosure means adjacent an entrance thereto, and

an irradiating means operable to emit bactericidal radiation towards the conveyor and articles thereon and disposed within the enclosure means downstream of the washing means.

7. The apparatus of claim 6 further comprising venting means adjacent the entrance to the enclosure means, being operable to induce an exhaust current from the enclosure means.

8. The apparatus of claims 6 or 7 wherein the enclosure means comprises a cabinet housing the washing means and a duct connecting the interior of the cabinet with the interior of the clean room.

9. The apparatus of claim 6, 7 or 8 wherein the washing means comprises a rotary bottle-washing mechanism.

10. The apparatus of any of claims 6 to 9, wherein the irradiating means comprises ultraviolet lamps.

11. The apparatus of any of claims 6 to 10, wherein the irradiating means produces heat.

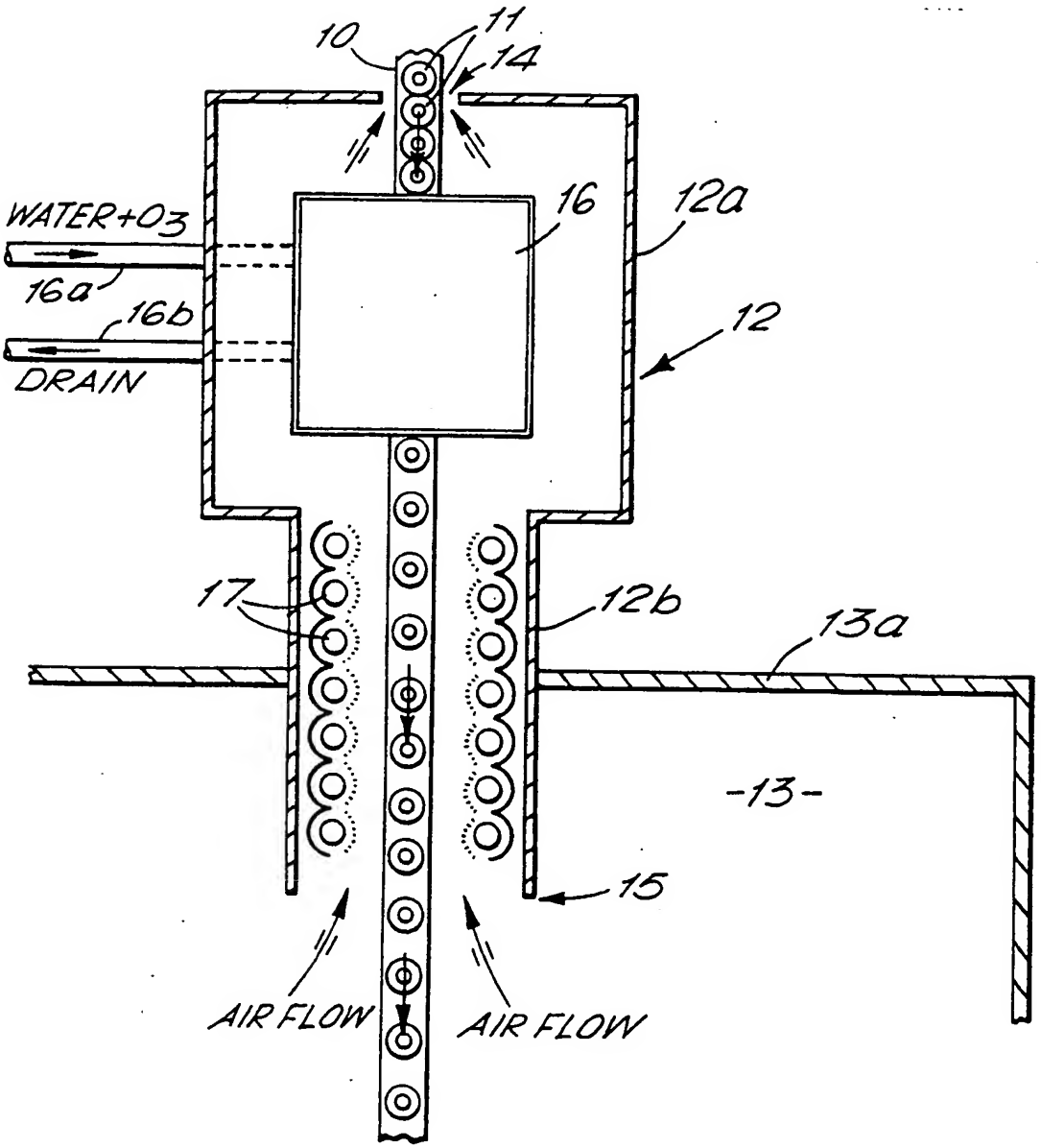
10
11
14
16
12a
WATER+O3
16a
16b
DRAIN
12
17
12b
13a
-13-
15
AIR FLOW
AIR FLOW

FIG.1.

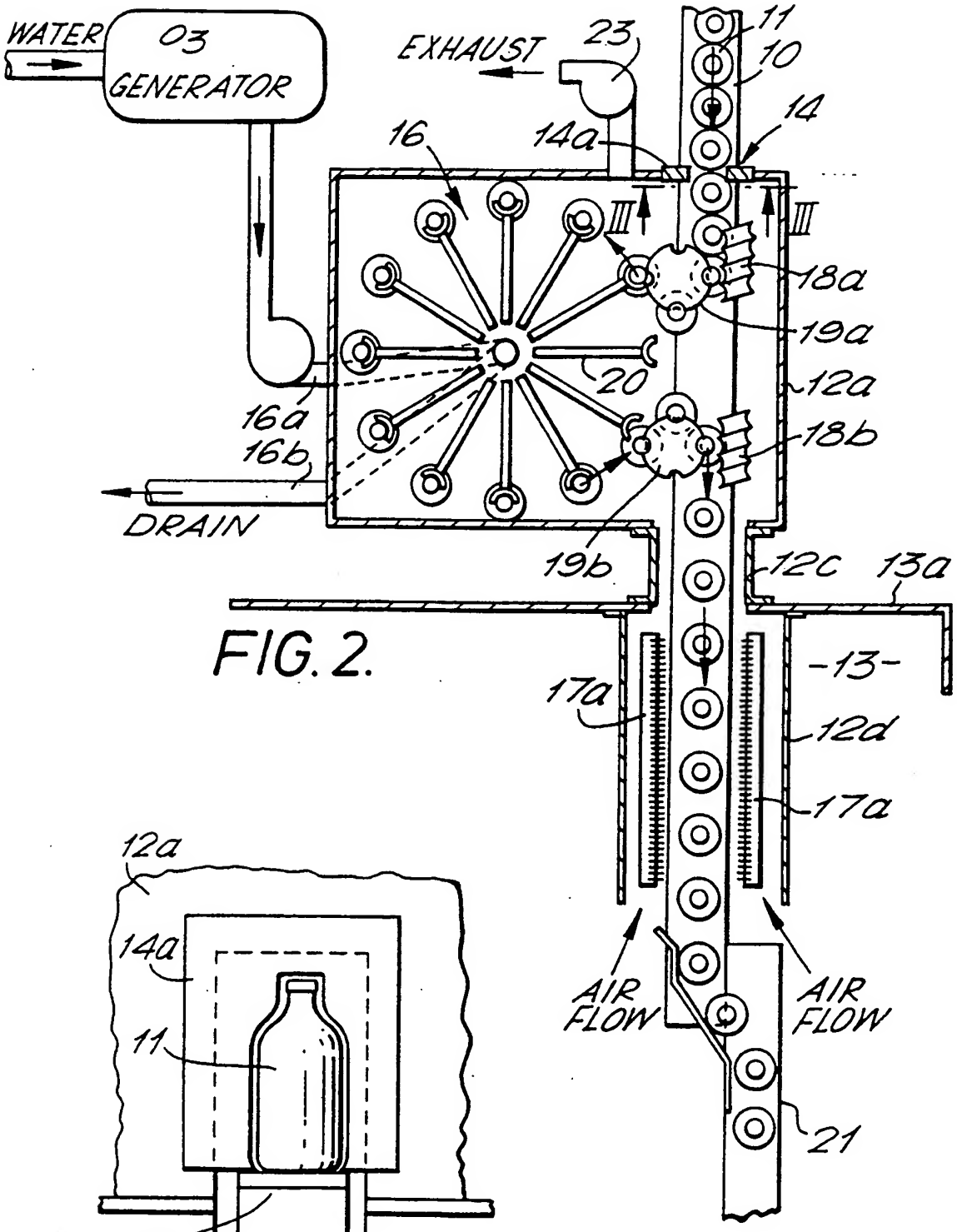
WATER
O3 GENERATOR
EXHAUST
23
11
10
14
16
14a
III
III
18a
19a
20
12a
16a
16b
18b
DRAIN
19b
12c
13a
-13-
17a
12d
17a
AIR FLOW
AIR FLOW
21

FIG. 2.

12a
14a
11
10

FIG. 3.

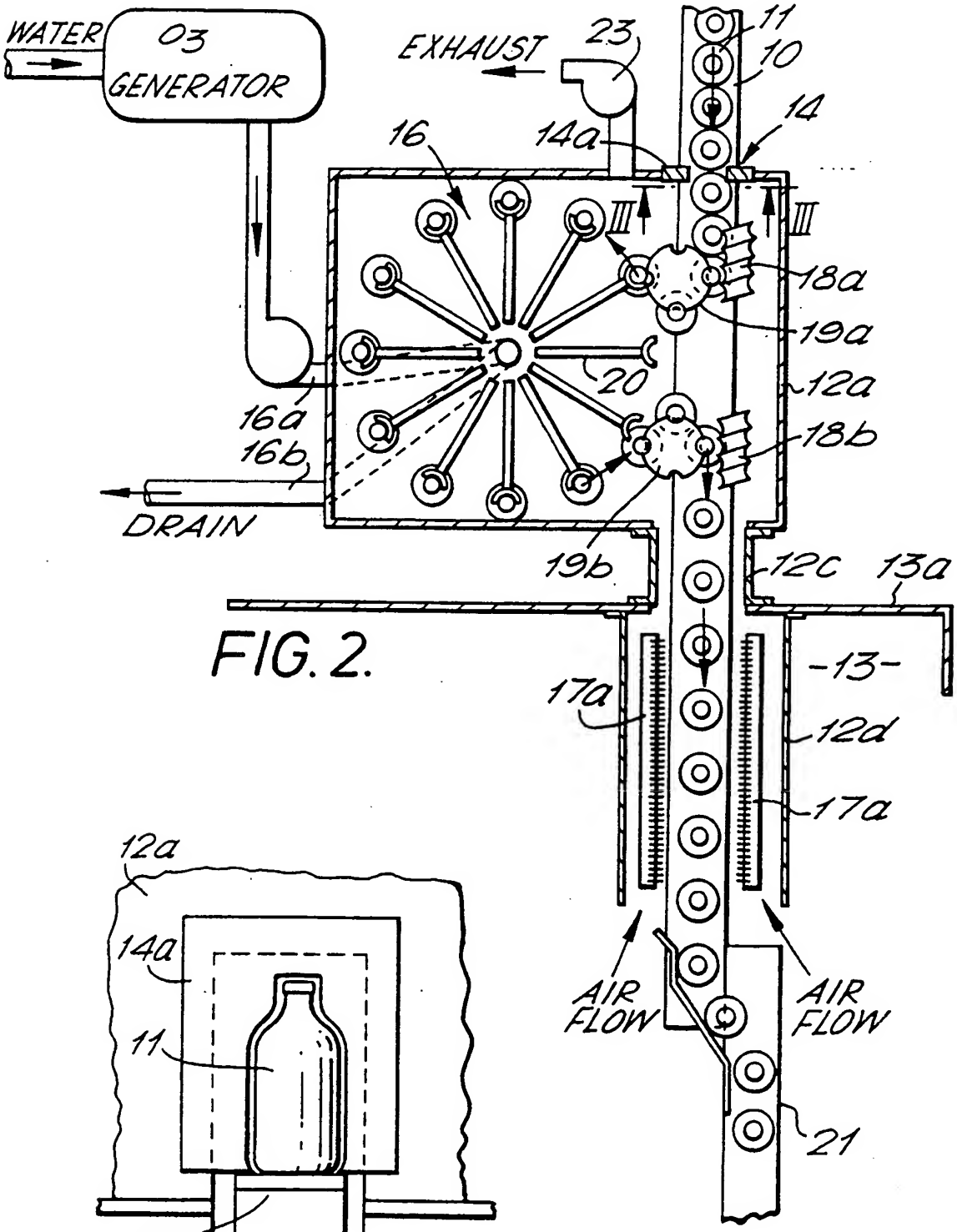
WATER
O3 GENERATOR
EXHAUST
23
11
10
14
16
14a
III
III
18a
19a
20
12a
16a
16b
18b
DRAIN
19b
12c
13a
-13-
17a
12d
17a
AIR FLOW
AIR FLOW
21

FIG. 2.

12a
14a
11
10

FIG. 3.

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/GB 94/02316

A. CLASSIFICATION OF SUBJECT M
IPC 6 B08B9/20 B 5/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B67C B65B B08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,31 38 215 (H. SILBERZAHN) 3 March 1983 see the whole document see page 9, line 6 - line 9	1-5
A	---	6,7,9,10
X	PATENT ABSTRACTS OF JAPAN vol. 14, no. 327 (M-998) 13 July 1990 & JP,A,02 109 836 (TOPPAN PRINTING CO LTD) 23 April 1990 see abstract	1,5,6,10
Y		3,4,9
A	---	2,7
Y	EP,A,0 436 042 (TOYO SEIKAN KAISHA LTD) 10 July 1991 see claims 1-7 see page 4, line 24 - line 31	3,4,9

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[X] Further documents are listed in the continuation of box C.

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C.(Continuation) DOCUMENTS CON[illegible]RED TO BE RELEVANT

Category *	Citation of document, with [illegible]cation, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 361 858 (ELOPAK SYSTEMS AG) 4 April 1990 see column 6, line 58 - column 8, line 15	1,5,6,10
Y		4
A		2,7,8

X	PATENT ABSTRACTS OF JAPAN vol. 16, no. 419 (C-981) 3 September 1992 & JP,A,04 144 672 (MITSUBISHI HEAVY IND LTD) 19 May 1992 see abstract	1,5
Y		4
A		3,6,10

X	CH,A,345 260 (R. JOVIGNOT) 29 April 1960 see page 3, line 99 - page 4, line 74 see page 5, line 113 - page 6, line 17	1-3
A		6-8,11

X	PATENT ABSTRACTS OF JAPAN vol. 14, no. 209 (M-968) 27 April 1990 & JP,A,02 045 336 (SNOW BRAND MILK PROD CO) 15 February 1990 see abstract	1,5,6,10
A		2,3

A	FR,A,2 129 901 (L' ASEPTISATION S.A.) 3 November 1972 see page 2, line 9 - line 13; claims 1,2	1-3,7,10

2

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
DE-A-3138215	03-03-83	DE-A-	3033043	11-03-82
		AT-B-	382315	10-02-87
		BE-A-	890190	04-01-82
		FR-A,B	2489153	05-03-82
		GB-A,B	2084550	15-04-82
		NL-A-	8104065	01-04-82
		US-A-	4409188	11-10-83
EP-A-0436042	10-07-91	JP-A-	3056222	11-03-91
		WO-A-	9101918	21-02-91
EP-A-0361858	04-04-90	NONE		
CH-A-345260		NONE		
FR-A-2129901	03-11-72	NONE		